CLAIMS

What is claimed is:

1. A method for determining the partial pressure of oxygen in a glass material comprising:

   measuring the optical transmission of the glass material using a plurality of wavelengths of light appropriate for detecting FeO and Fe_2O_3 content;

   converting each measured optical transmission performed on the glass material to an extinction coefficient; and

   converting the entirety of the extinction coefficient data to a ratio of $[Fe_2O_3]^2/[FeO]^4$ content in the glass material, wherein the ratio of $[Fe_2O_3]^2/[FeO]^4$ is proportional to the partial pressure of oxygen in the glass material.

2. The method of claim 1, wherein the measuring of the optical transmission of the glass material is at three or more intervals between wavelengths of approximately 350 nm and 1400 nm.

3. The method of claim 1, wherein the measuring of the optical transmission of the glass material is at 10 nm intervals between the wavelengths of approximately 350 nm and 1400 nm.

4. The method of claim 1, wherein the glass material is ultra-pure/ultra-fine glass material and the method further comprises stacking a plurality of thin sheets of the ultra-pure/ultra-fine glass material to form an edge for measuring the optical transmission.

5. The method of claim 4, wherein the edge is approximately 1 cm thick.

6. A method for quantifying a change in operating conditions for the production of a glass material comprising:

preparing a first glass material using a first set of operating conditions;

spectroscopically determining the ratio of $[Fe_2O_3]^2/[FeO]^4$ in the first glass material using a plurality of wavelengths between 350 nm and 1400 nm;

converting the ratio of $[Fe_2O_3]^2/[FeO]^4$ into a relative partial pressure of oxygen in the first glass material;

preparing a second glass material using a second set of operating conditions;

spectroscopically determining the ratio of $[Fe_2O_3]^2/[FeO]^4$ in the second glass material using a plurality of wavelengths between 350 nm and 1400 nm;

converting the ratio of $[Fe_2O_3]^2/[FeO]^4$ into a relative partial pressure of oxygen in the second glass material; and

comparing the partial pressure of oxygen in the first glass material to the partial pressure of oxygen in the second glass material, wherein the comparison provides direction for making a change to the first or second operating conditions.

7. The method of claim 6, wherein the operating conditions comprise addition of a fining agent.

8. A method for measuring an oxidation state in an ultra-pure/ultra-fine sheet of production glass comprising:

preparing a plurality of production glass samples from the production glass;

stacking the plurality of production glass samples to provide at least one cut edge of the stack;

measuring the optical transmission of the stacked production glass samples by shining a wavelength of light appropriate for detecting FeO and Fe_2O_3 content through the cut edge of the stack;

converting each measured optical transmission performed on the production glass to an extinction coefficient; and

converting the entirety of the extinction coefficient data to a ratio of $[Fe_2O_3]^2/[FeO]^4$ content in the production glass material, wherein the

ratio of $[Fe_2O_3]^2/[FeO]^4$ is proportional to the oxidation state in the ultra-pure/ultra-fine sheet of production glass.

9. The method of claim 8, wherein the at least one cut edge of the stack is approximately 1 cm thick.

10. The method of claim 9, wherein the cut edge is substantially flat.

11. The method of claim 8, wherein the optical transmission of at least one of the stacked production glass samples is measured at 10 nm intervals between the wavelengths of approximately 350 nm and 1400 nm.

12. A method for assigning a glass material to an appropriate use based on the partial pressure of oxygen in the glass material, the method comprising:

measuring optical transmission of the glass material using three or more wavelengths of light between 200 nm and 3000 nm;

converting each measured optical transmission performed on the glass material to an extinction coefficient;

converting the entirety of the extinction coefficient data to a ratio of $[Fe_2O_3]^2/[FeO]^4$ content in the glass material, wherein the ratio of $[Fe_2O_3]^2/[FeO]^4$ is proportional to the partial pressure of oxygen in the glass material; and

assigning the glass material, based on its partial pressure of oxygen, to a use, wherein each use can only be provided glass materials having an associated upper threshold level of oxygen.